

Chapter 8 AIR CONDITIONING AND NBC PROTECTION SYSTEMS

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Cabin air conditioning system

1. Except for alterations to the distribution duct which supplies conditioning air to the navigator's feet, and minor changes to adjacent cabin temperature control system piping, the cabin air conditioning and associated systems installed in post-Mod 1188 aircraft are identical to those described and illustrated in AP 101B-1202-1A, Cover 2, Sect 3, Chap 8. The modified air distribution ducting is shown in Fig. 1.

Radio bay air conditioning system

2. Apart from the exceptions detailed in the following paragraphs, the radio bay air conditioning system installed in post-Mod 1188 aircraft is identical to that described in AP 101B-1202-1A, Cover 2, Sect 3, Chap 8.

3. On post-Mod 1478 aircraft, cooling air is supplied to the Martel video tape recorder by an additional air supply pipe. This pipe extends from a tapping on

the cooling pipe for the ARI 23172 amplifier unit (item 1 on Fig. 12 of Sect 3, Chap 8) to the mounting box for the video tape recorder/Buccaneer interface unit (pre-Mod 1800) on the port D door which forms the rear of the radio bay at frame 562.5.

4. On post-Mod 1800, pre-Mod 1812 aircraft the system is extended to include the inertial navigation unit (INU) and interface unit (IFU). An additional outlet from the ducting conveys the air supply to the INU and IFU mounting trays (Fig.4). The cooling air for the INU is passed through a heat exchanger to raise the conditioning air temperature to a nominal 30°C, ensuring that no free water enters the INU. On embodiment of Mod 1812, the ducting is further modified to pass the cooling air for both the INU and IFU through the heat exchanger. The heat exchanger is replaced by a new unit incorporating a mixer section and an electrically driven fan in addition to the heater block. Details of the electrical operation of the INU cooling air system are given in Sect 16, Chap 8A.

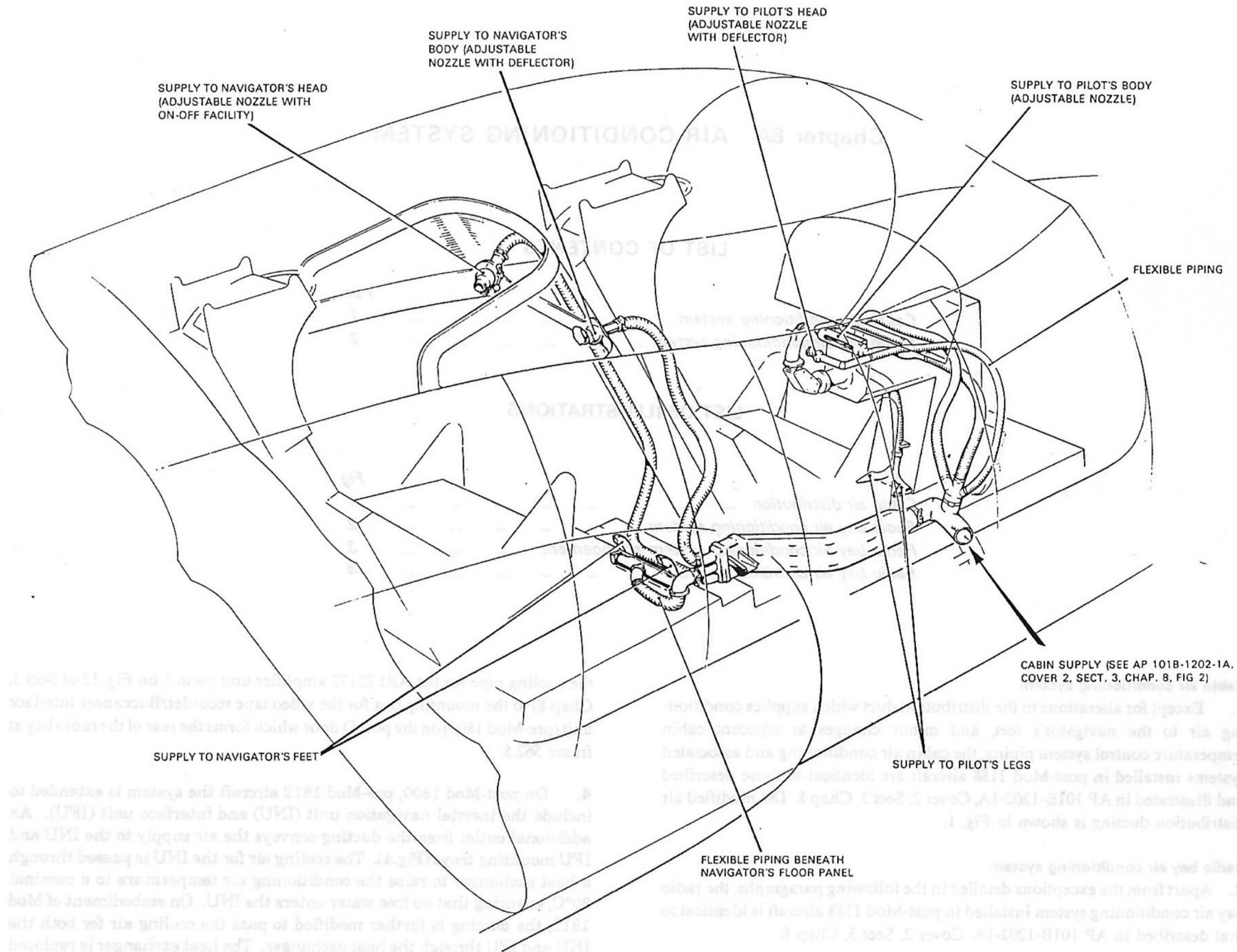
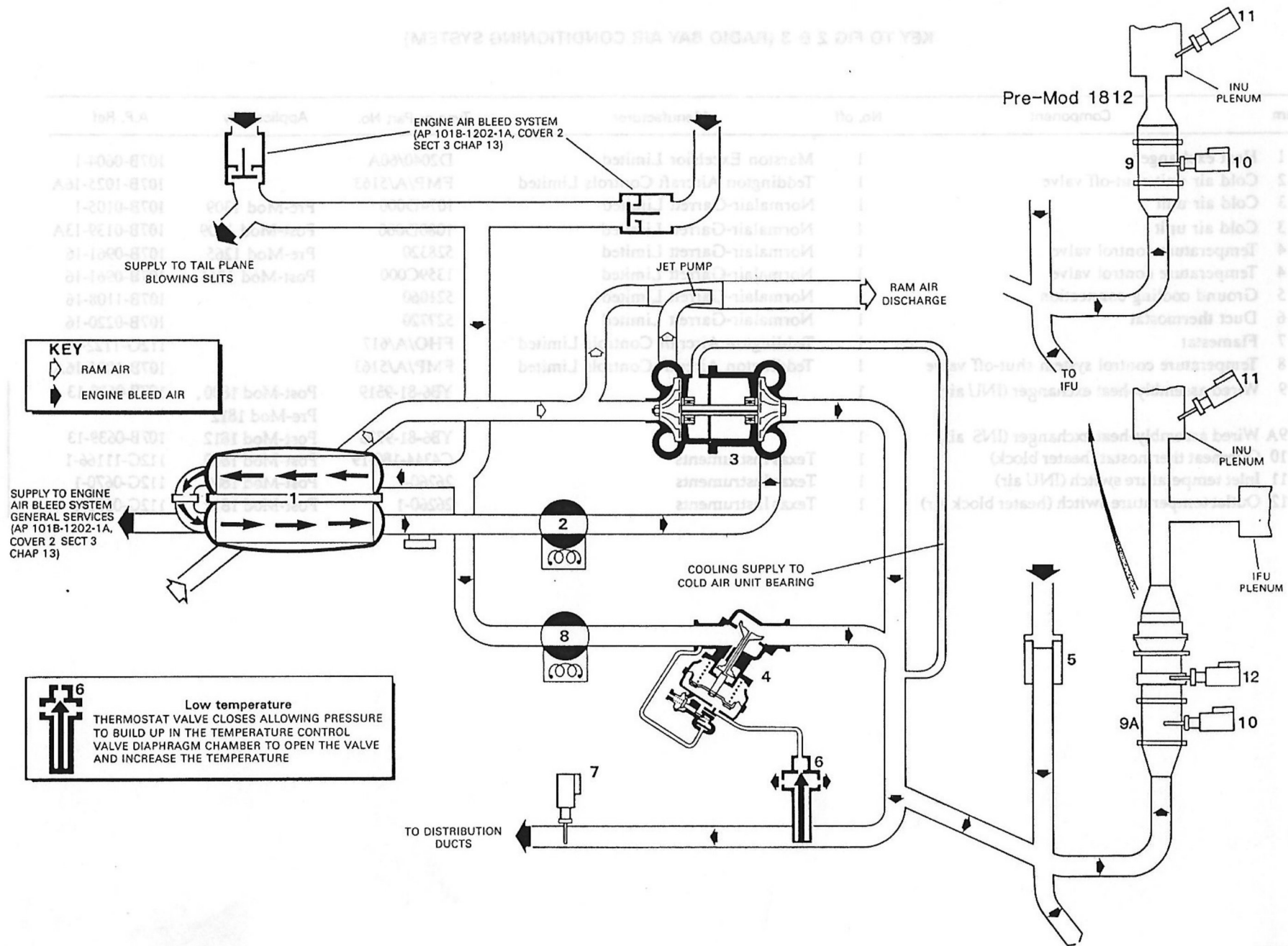


Fig. 1 Cabin air distribution

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KEY TO FIG 2 & 3 (RADIO BAY AIR CONDITIONING SYSTEM)

Item	Component	No. off	Manufacturer	Type or Part No.	Applicability	A.P. Ref
1	Heat exchanger	1	Marston Excelsior Limited	D2040/60A		107B-0604-1
2	Cold air unit shut-off valve	1	Teddington Aircraft Controls Limited	FMP/A/5163		107B-1025-16A
3	Cold air unit	1	Normalair-Garrett Limited	1074D000	Pre-Mod 1309	107B-0105-1
3	Cold air unit	1	Normalair-Garrett Limited	1080D000	Post-Mod 1309	107B-0139-13A
4	Temperature control valve	1	Normalair-Garrett Limited	528320	Pre-Mod 1265	107B-0961-16
4	Temperature control valve	1	Normalair-Garrett Limited	1359C000	Post-Mod 1265	107B-0961-16
5	Ground cooling connection	1	Normalair-Garrett Limited	521060		107B-1108-16
6	Duct thermostat	1	Normalair-Garrett Limited	527720		107B-0220-16
7	Flamestat	1	Teddington Aircraft Controls Limited	FHO/A/617		112G-1122-16
8	Temperature control system shut-off valve	1	Teddington Aircraft Controls Limited	FMP/A/5163		107B-1025-16A
9	Wired assembly-heat exchanger (INU air)	1		YB6-81-9519	Post-Mod 1800, Pre-Mod 1812	107B-0639-13
9A	Wired assembly-heat exchanger (INS air)	1		YB6-81-9735	Post-Mod 1812	107B-0639-13
10	Overheat thermostat (heater block)	1	Texas Instruments	C4344-180-19	Post-Mod 1800	112G-11166-1
11	Inlet temperature switch (INU air)	1	Texas Instruments	26260-1	Post-Mod 1800	112G-0670-1
12	Outlet temperature switch (heater block air)	1	Texas Instruments	26260-1	Post-Mod 1812	112G-0670-1



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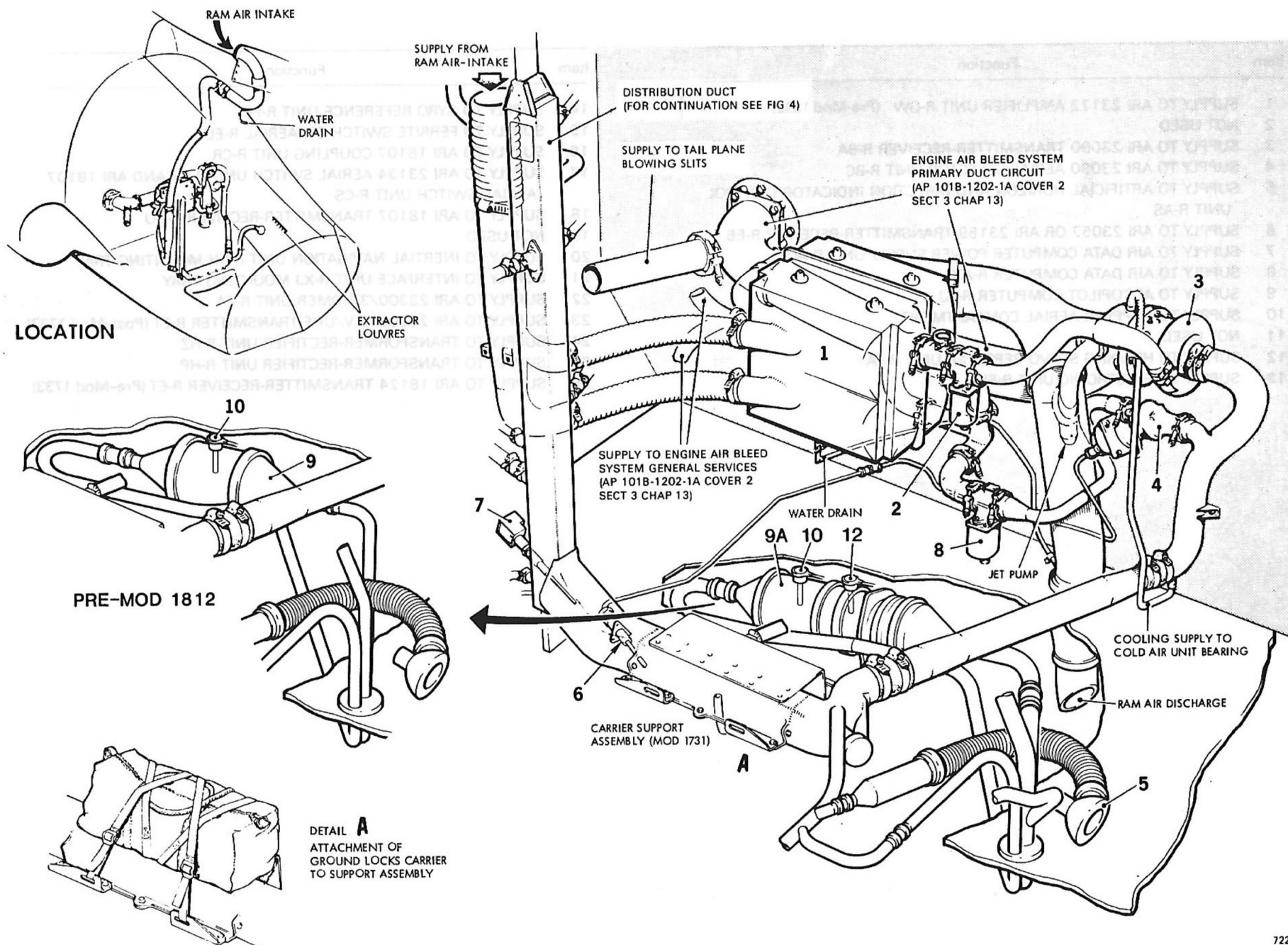


Fig. 3 Radio bay air conditioning system arrangement

► (Mod 1812 incorporated) ◀

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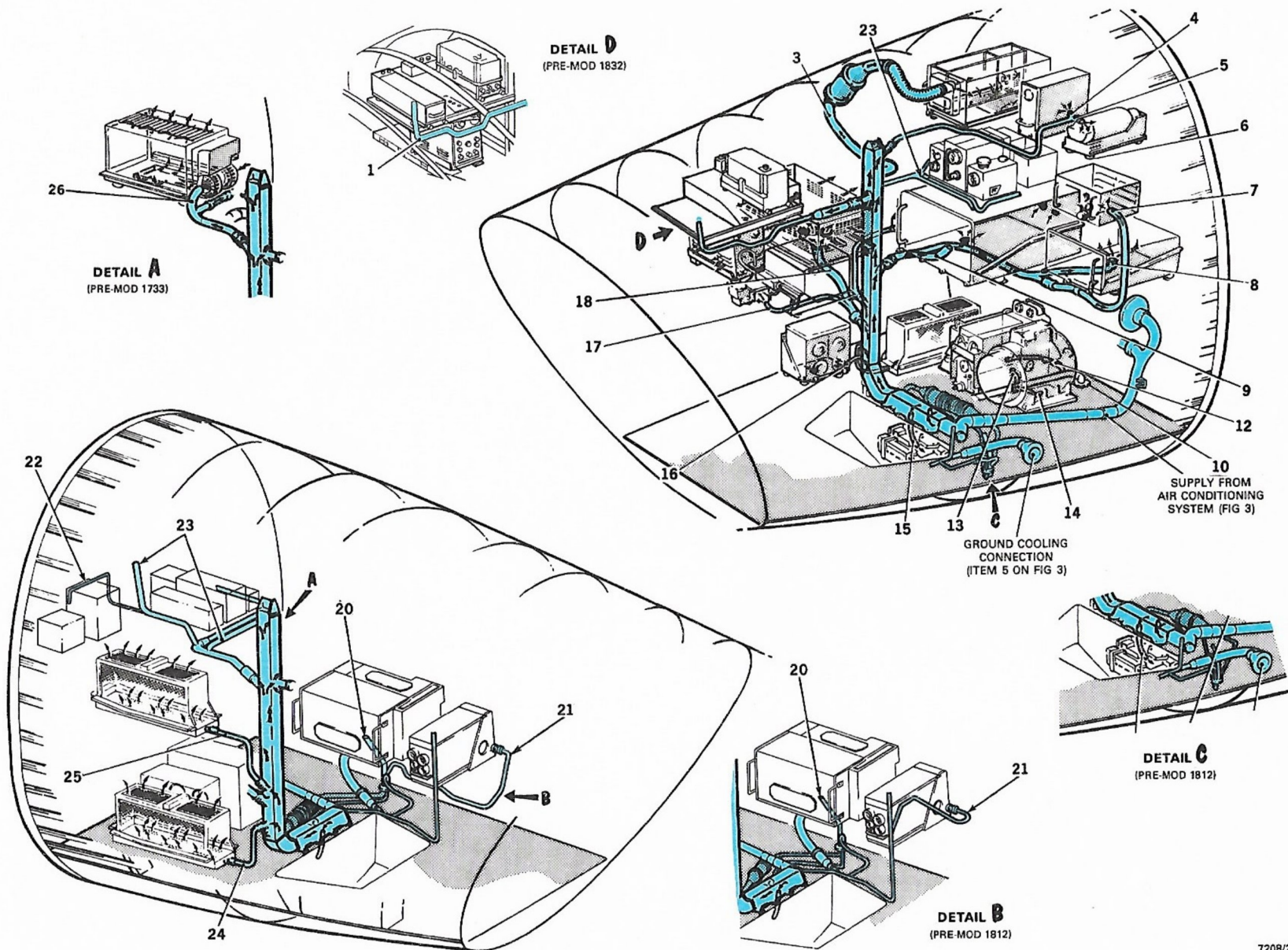


Fig. 4 Radio bay air distribution
 ► (Mod 1832 incorporated) ◄

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Introduction

1. Provision is made on post-Mod 1692 aircraft for the protection of aircrew against the effects of nuclear, biological and chemical (NBC) toxic agents in vapour, liquid and particulate forms. On these aircraft, supplies of filtered air are available for use with special flying clothing and breathing equipment, to prevent ingestion of contaminated air to the respiratory tracts and surface contamination of the head and neck.

2. This Chapter describes the basic aircraft systems and components. Details of the electrical installation are in Section 16 of this publication and a detailed list of components with associated references is in the corresponding section of AP 101B-1202-10B1. For details of the aircrew clothing and personal equipment refer to the publications listed in AP 100Z-0101.

DESCRIPTION

General

3. The aircraft installation consists of two separate systems, pilot's and navigator's, which, with the exception of a master selector switch in the pilot's cockpit, are controlled individually by the crew members. The main components of each system are a switch-operated motor driven fan and an associated voltage regulator, two filtration canisters and a hazard warning unit. The fan draws cabin air through the filtration canisters and supplies the filtered air via the personal equipment connector (PEC) and a manifold incorporated into the personal equipment, to a hood worn by the crew member. The hood has a close-fitting transparent face-plate moulded to house a respirator and completely covers the head and neck. A neck seal is incorporated to seal the hood from the cockpit environment.

4. The fan speed is controlled by the voltage regulator to deliver air at a pressure between 2.5 and 3.0 in. wg (50 litres/min at 15 deg C at sea level). While this air supply is provided only for ventilation, breathing oxygen, which is also routed through the manifold, can be used for hood ventilation in the event of fan failure or a similar emergency. This is effected by a manually-operated valve in the manifold.

Aircraft equipment and controls

Pilot's system (Fig. 1)

5. With the exception of the two control switches and warning indication, the components of the pilot's system (fan, voltage regulator, hazard warning unit and filtration canisters) are mounted on a detachable panel, C-LZ, located on the starboard side of the cockpit between frame stations 136 and 151.5. The panel fits over the essential services fuse panel, C-J, and is secured to its mounting brackets by four Dzus fasteners. A retaining cable attached between the panel and the airframe supports the panel when it is removed for access to the fuse panel. The air supply from the fan is connected by a flexible hose to the aircraft portion of the PEC as shown in Chap 11. Two toggle switches, one labelled NBC ROLE, ON-OFF (with guard), the other labelled NBC FAN, ON-OFF, are mounted on a bracket attached to the inboard side of the starboard console. Indication of failure of the fan is via the standard warning system and a caption 'NBC' in the standard warning panel.

Navigator's system (Fig. 2)

6. The main components of the navigator's system are located on the rear pressure bulkhead (station 186). The fan, C-LY, voltage regulator, C-LX, and

hazard warning unit, C-LW, are supported in three separate mountings attached to the bulkhead while the filtration canisters are mounted on a detachable panel fitted over fuse panel C-HR. The panel is secured by four Dzus fasteners and a retaining cable is fitted to support the panel when it is removed for access to panel C-HR. A flexible hose connects from the fan outlet to the aircraft portion of the PEC. The fan control switch, labelled NBC FAN, ON-OFF and a warning indicator module with the caption 'NBC', are mounted adjacent to the air temperature indicator on the port side of the cockpit.

SERVICING

General

WARNING ...

BEFORE ANY SERVICING IS CARRIED OUT IN OR AROUND THE CABIN, SAFETY PRECAUTIONS ON THE EJECTION SEATS AND CANOPY JETTISON SYSTEM MUST BE STRICTLY OBSERVED.

7. Servicing of the NBC protection system is confined to the replacement of the front and rear cockpit filter canisters and a leak rate and performance functional check at periods detailed in AP 101B-1202-5A1. On completion of servicing and/or removal and replacement of any of the system components a leak rate and performance test detailed in AP 101B-1202-5A3A is to be performed.

REMOVAL AND INSTALLATION

General

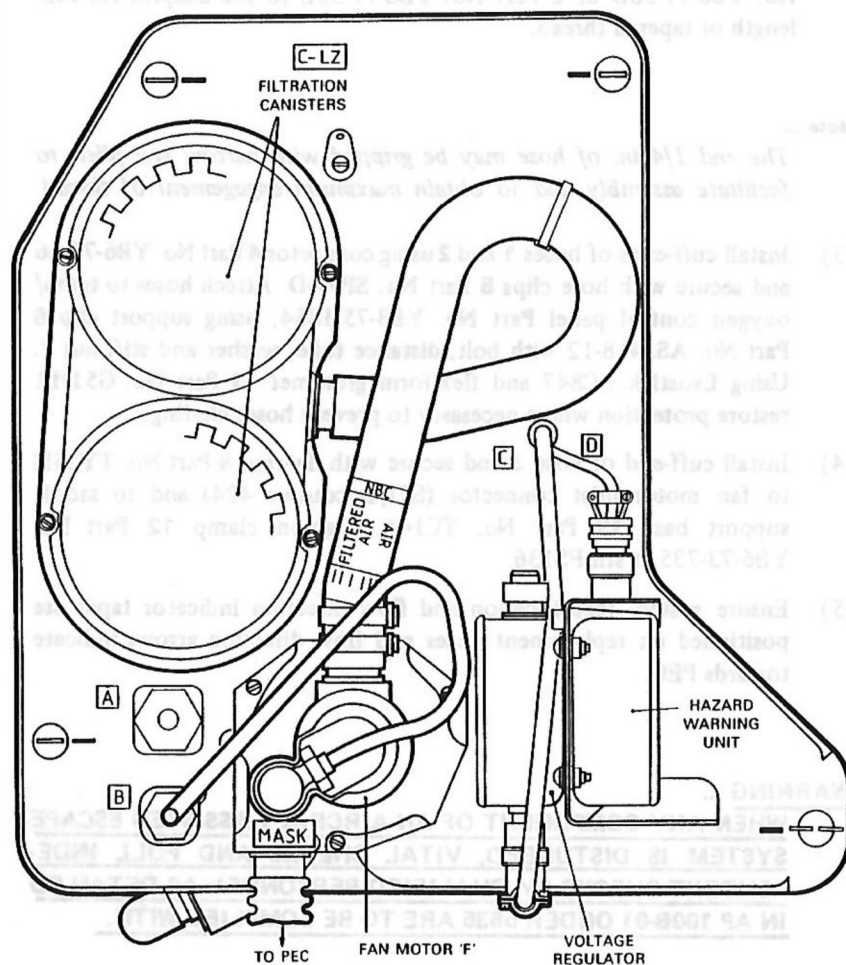
WARNING ...

BEFORE ANY SERVICING IS CARRIED OUT IN OR AROUND THE CABIN, SAFETY PRECAUTIONS ON EJECTION SEAT AND CANOPY JETTISON SYSTEM, DETAILED IN AP 101B-1202-5A2 AND 5A3, ARE TO BE STRICTLY OBSERVED.

8. Before removing or installing any components of the system, the aircraft must be rendered electrically safe (AP 101B-1202-1B, Cover 1, Section 6, Chap 1). After installing any components, tests must be carried out to ensure correct operation of the component and system. Removal and installation procedures for electrical components of the installation are detailed in Sect 16 Chap 8D of this publication.

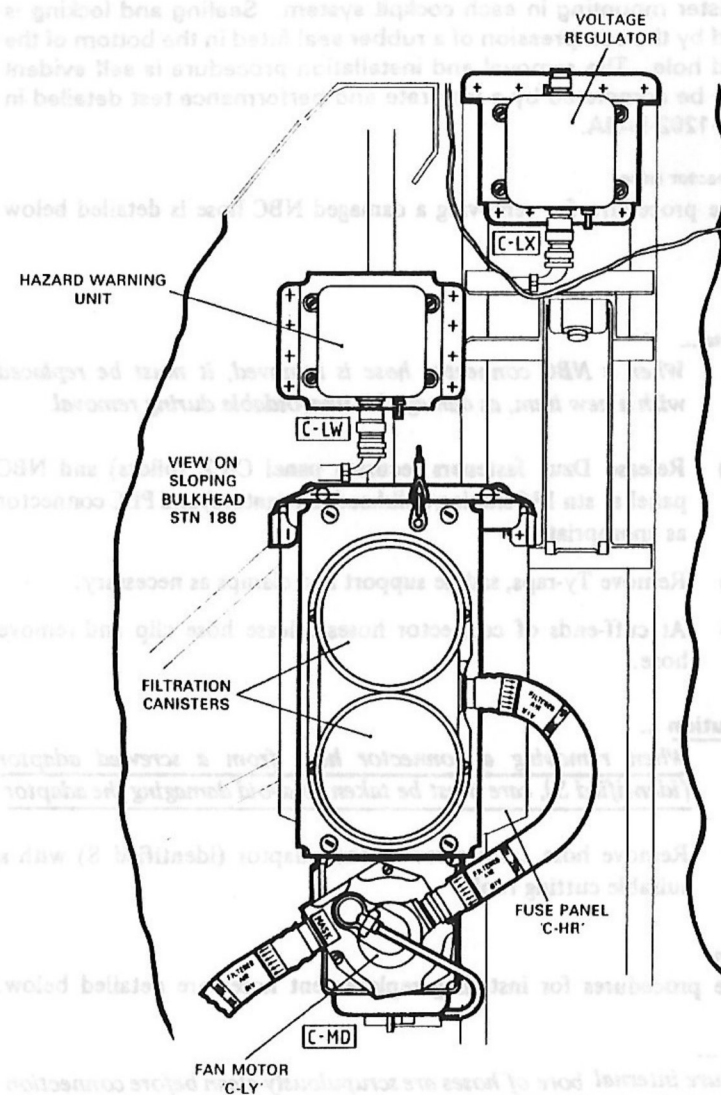
Note ...

All opened pipelines and component orifices must be immediately blanked to prevent ingress of foreign matter.



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Fig.1 Pilot's NBC role panel
(STI/Buccaneer 424 incorporated)



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Fig.2 Navigator's NBC equipment
(STI/Buccaneer 424 incorporated)

Filter canister

9. Two filter canisters NBC S10 No.2 Mk.1 (post-Mod 1829) or NBC S6 No.2 Mk.1 (pre-Mod 1829) are screwed into two threaded holes of the canister mounting in each cockpit system. Sealing and locking is achieved by the compression of a rubber seal fitted in the bottom of the threaded hole. The removal and installation procedure is self evident and is to be completed by a leak rate and performance test detailed in AP 101B-1202-5A3A.

NBC connector hoses

10. The procedure for removing a damaged NBC hose is detailed below.

Removal

11.

Note ...

When a NBC connector hose is removed, it must be replaced with a new item, as damaged is unavoidable during removal.

- (1) Release Dzus fasteners securing panel C-LZ (pilots) and NBC panel at stn 186 sloping bulkhead (navigators) and PEC connector as appropriate.
- (2) Remove Ty-raps, saddle support and clamps as necessary.
- (3) At cuff-ends of connector hoses release hose clip and remove hose.

Caution ...

When removing a connector hose from a screwed adaptor (identified S), care must be taken to avoid damaging the adaptor.

- (4) Remove hose from screwed end adaptor (identified S) with a suitable cutting tool.

Installation

12. The procedures for installing replacement hoses are detailed below.

Cautions ...

- (1) Ensure internal bore of hoses are scrupulously clean before connection.
- (2) Replacement hoses must not be twisted during assembly otherwise inner lamination damage will occur.
- (3) The use of any other lubricant except water, is not permitted.

13. Pilot's Installation (Fig.3)

- (1) Sparingly lubricate screwed end adaptors (identified S) with silicone grease DC33 (MS33). Remove excess with a lint-free cloth.
- (2) Screw the connector hose 1 Part No. YB6-71-58A, 2 Part No. YB6-71-58D or 3 Part No. YB6-71-58E to the adaptor for full length of tapered thread.

Note ...

The end 1/4 in. of hose may be gripped with narrow jaw pliers to facilitate assembly and to obtain maximum engagement of thread.

- (3) Install cuff-ends of hoses 1 and 2 using connector 4 Part No. YB6-71-56 and secure with hose clips 5 Part No. SP91-D. Attach hoses to temp/oxygen control panel Part No. YB3-75-1854, using support clip 6 Part No. AS5418-12 with bolt, distance tube, washer and stiff nut 7. Using Evostick EC847 and flexiform grommet 11 Part No. G51HA restore protection where necessary to prevent hoses chafing.
- (4) Install cuff-end of hose 3 and secure with Ty-raps 8 Part No. TY25M to fan motor inlet connector (STI/Buccaneer 424) and to saddle support base 13 Part No. TC141. Tighten clamp 12 Part No. YB6-73-735 at stn FS136.
- (5) Ensure system identification and flow direction indicator tapes are positioned on replacement hoses and flow direction arrows indicate towards PEC.

WARNING ...

WHEN ANY COMPONENT OF AN AIRCRAFT ASSISTED ESCAPE SYSTEM IS DISTURBED, VITAL CHECKS AND FULL INDEPENDENT CHECKS BY QUALIFIED PERSONNEL AS DETAILED IN AP 100B-01 ORDER 5635 ARE TO BE COMPLIED WITH.

- (6) Adjust hose lengths to ensure seat clearance and travel extension is obtained with no foul or tautness.
- (7) Refit PEC portions and secure NBC panel C-LZ.
- (8) Carry out leak rate and performance test detailed in AP 101B-1202-5A3A.

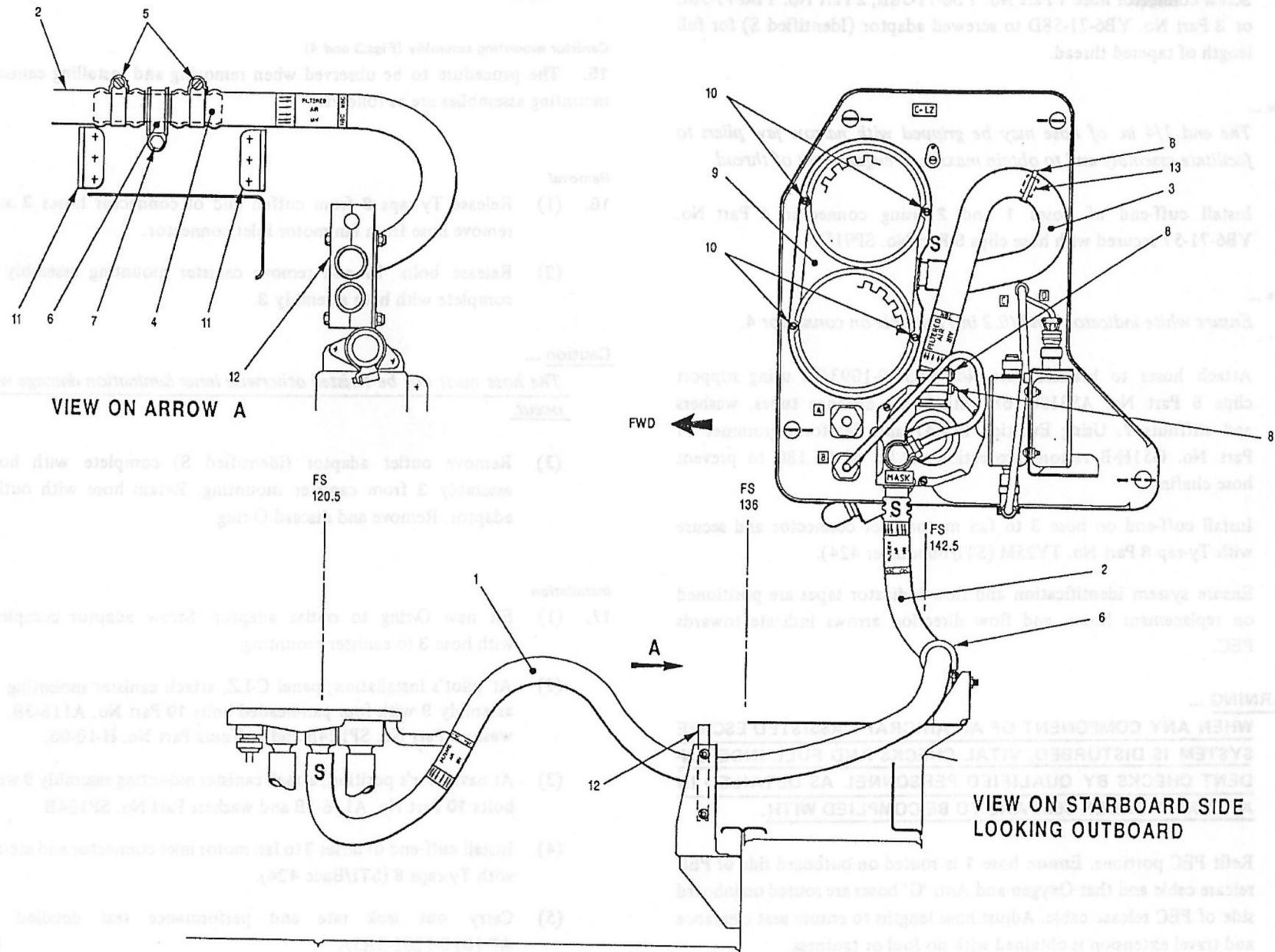


Fig.3 Pilot's NBC protection system

14. Navigator's installation (Fig.4)

- (1) Sparingly lubricate screwed adaptor (Identified S) with silicone grease DC33 (MS33). Remove excess with a lint-free cloth,
- (2) Screw connector hose 1 Part No. YB6-71-58B, 2 Part No. YB6-71-58C or 3 Part No. YB6-71-58D to screwed adaptor (Identified S) for full length of tapered thread.

Note ...

The end 1/4 in. of hose may be gripped with narrow jaw pliers to facilitate assembly and to obtain maximum engagement of thread.

- (3) Install cuff-end of hoses 1 and 2 using connector 4 Part No. YB6-71-57 secured with hose clips 5 Part No. SP91D.

Note ...

Ensure white indicator band (0.2 in.) is visible on connector 4.

- (4) Attach hoses to bracket Part No. YB3-80-1093/34 using support clips 6 Part No. AS3180-16B with bolts, distance tubes, washers and stiffnuts 7. Using Evostick EC847 and flexiform grommet 11 Part No. G51H-B restore protection on lip of FS.180 to prevent hose chafing.
- (5) Install cuff-end on hose 3 to fan motor inlet connector and secure with Ty-rap 8 Part No. TY25M (STI/Buccaneer 424).
- (6) Ensure system identification and flow indicator tapes are positioned on replacement hoses, and flow direction arrows indicate towards PEC.

WARNING ...

WHEN ANY COMPONENT OF AN AIRCRAFT ASSISTED ESCAPE SYSTEM IS DISTURBED, VITAL CHECKS AND FULL INDEPENDENT CHECKS BY QUALIFIED PERSONNEL AS DETAILED IN AP 100B-01 ORDER 5635 ARE TO BE COMPLIED WITH.

- (7) Refit PEC portions. Ensure hose 1 is routed on outboard side of PEC release cable and that Oxygen and Anti 'G' hoses are routed on inboard side of PEC release cable. Adjust hose lengths to ensure seat clearance and travel extension is obtained with no foul or tautness.

- (8) Secure NBC panel at stn 186 sloping bulkhead.

- (9) Carry out leak rate and performance test detailed in AP 101B-1202-5A3A.

Canister mounting assembly (Figs.3 and 4)

15. The procedure to be observed when removing and installing canister mounting assemblies are as follows:

Removal

16. (1) Release Ty-raps 8 from cuffed end of connector hoses 3 and remove hose from fan motor inlet connector.
- (2) Release bolts 10 and remove canister mounting assembly 9 complete with hose assembly 3.

Caution ...

The hose must not be twisted otherwise inner lamination damage will occur.

- (3) Remove outlet adaptor (identified S) complete with hose assembly 3 from canister mounting. Retain hose with outlet adaptor. Remove and discard O-ring.

Installation

17. (1) Fit new O-ring to outlet adaptor. Screw adaptor complete with hose 3 to canister mounting.
- (2) At pilot's installation, panel C-LZ, attach canister mounting assembly 9 with four pan-headed bolts 10 Part No. A116-3B, washers Part No. SP124B and stiffnuts Part No. H-10-06.
- (3) At navigator's position, attach canister mounting assembly 9 with bolts 10 Part No. A116-1B and washers Part No. SP124B.
- (4) Install cuff-end of hoses 3 to fan motor inlet connector and secure with Ty-raps 8 (STI/Bucc 424).
- (5) Carry out leak rate and performance test detailed in AP 101B-1202-5A3A.

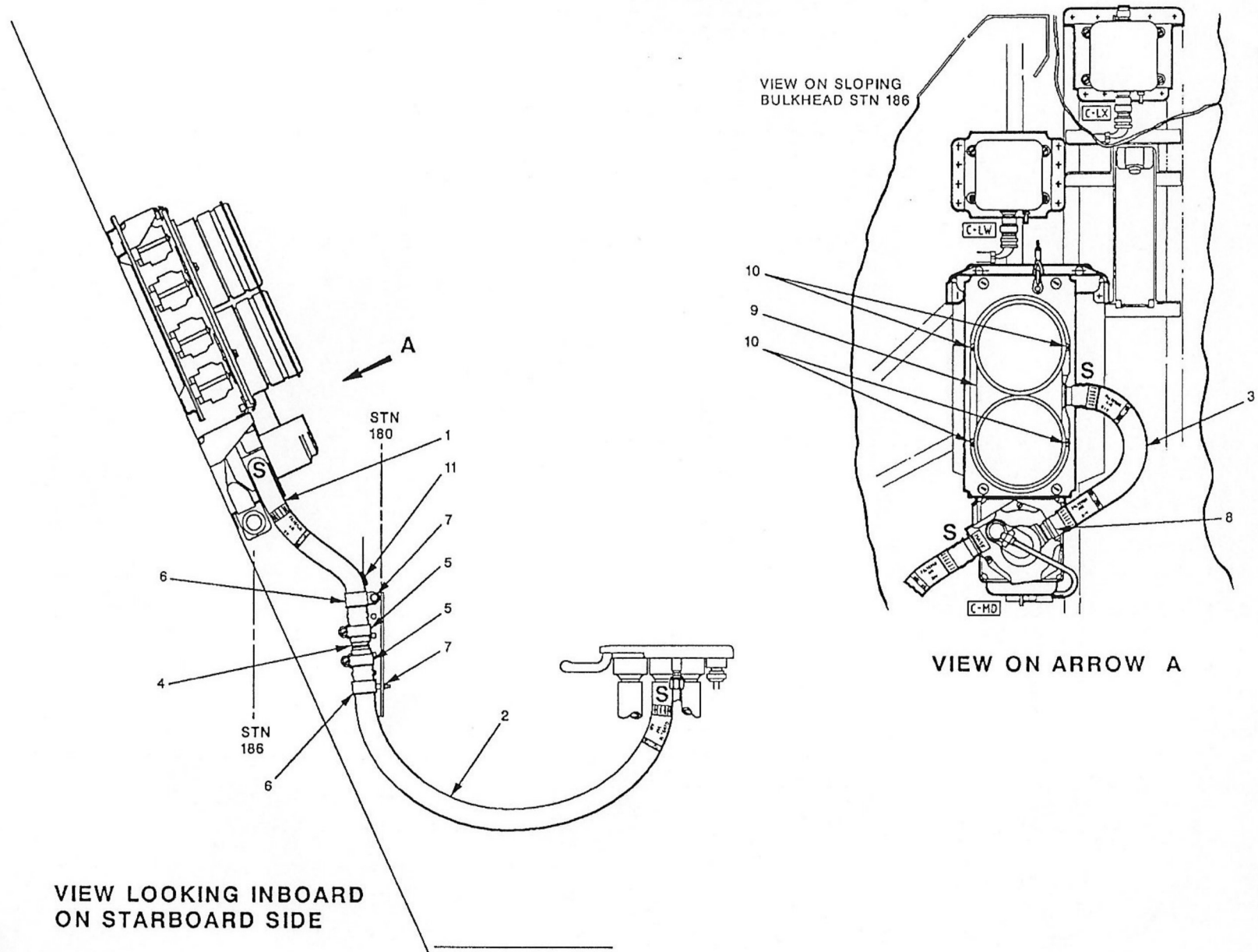


Fig.4 Navigators NBC protection system